Claims:

1. Device for extraction of pins at fixation means for fixation of bone fragments at bone fractures,

wherein the fixation means (2) includes a sleeve (6) and at least one pin (7) provided in said sleeve (6),

wherein the sleeve (6) at a front end portion (9) has at least one opening (10) in a longitudinal side thereof,

wherein a front part (11) of the pin (7) extends, when said pin (7) is located in an operating position, out of the sleeve (6) through the opening (10) and engage bone material of one of the bone fragments (3, 4), and

wherein the extraction device (1) is adapted to pull the pin (7) in a backwards direction relative to the sleeve (6) in order to withdraw the front part (11) of the pin (7) from bone material of one of the bone fragments (3, 4) and into the sleeve (6),

c h a r a c t e r i z e d i n

that the extraction device (1) comprises means (12, 13 and 14) which are provided to draw or pull the pin (7) backwards relative to the sleeve (6) without thereby subjecting the pin (7) to torsional forces in relation thereto.

2. Device according to claim 1, c h a r a c t e r i z e d i n

that said means includes an inner extraction member (12), an outer extraction member (13) and an extraction handle (14),

that the inner extraction member (12) is operable by means of the extraction handle (14) for pulling said inner extraction member (12) and the pin (7) connected thereto in a direction of extraction or withdrawal (R) backwards relative to the outer extraction member (13) and the sleeve (6), and

that rotary preventing members (29, 32) are provided to, during backward movement of the inner extraction mem-

ber (12) and the pin (7) in the direction of extraction (R), prevent turning or rotation of the inner extraction member (12) and the pin (7) relative to the outer extraction member (13) and the sleeve (6).

3. Device according to claim 2, c h a r a c t e r i z e d i n

that the outer extraction member (13) is prevented from rotating about a geometric centre line (C) which extends along said member (13) by holding fast said outer extraction member (13) manually, and

that the outer and inner extraction members (13, 12) include said rotary preventing members (29, 32) which are provided such that when the outer extraction member (13) is held fast such that it can not turn or rotate, neither can said inner extraction member (12) turn or rotate about said centre line (C).

4. Device according to claim 3, c h a r a c t e r i z e d i n

that said rotary preventing members (29, 32) are oval parts of a through hole (33) in the outer extraction member (13) and thereby cooperating with oval parts of the inner extraction member (12), and

that the rotary preventing members (29, 32) cooperate with each other when the inner extraction member (12) is inserted into the through hole (33) of the outer extraction member (13).

5. Device according to claim 4, c h a r a c t e r i z e d i n

that the rotary preventing members (32) of the outer extraction member (13) are provided in a rear end portion (31) of the outer extraction member (13), and

that the rotary preventing members (29) of the inner extraction member (12) are provided on a rear end portion (24) of the inner extraction member (12).

6. Device according to any of claims 2-5, c h a r a c t e r i z e d i n that the lengths of the inner and outer extraction members (12, 13) and the location

and shape of their rotary preventing members (29, 32) are chosen such that the extraction handle (14) can cooperate with the inner extraction member (12) only in order to draw or pull said inner extraction member (12) backwards in the direction of extraction or withdrawal (R) only when said inner extraction member (12) is inserted into the outer extraction member (13) such that their rotary preventing members (29, 32) cooperate with each other.

7. Device according to any preceding claim, c h a r a c t e r i z e d i n that at least one part (26 and/or 23) limiting the extraction or withdrawal is provided in order to ensure that the extraction handle (14), through the inner extraction member (12), can draw or pull the pin (7) backwards so far relative to the sleeve (6), but not farther, that a tip (35) of the pin (7) is situated in the opening (10) of the sleeve (6), and can thereby cooperate with a rear edge of the opening (10) such that the pin (7), through said cooperation with the rear edge of the opening (10), can draw or pull the sleeve (6) backwards along with it in the direction of extraction or withdrawal (R) when the sleeve (6) shall be pulled out of the bone fragment (3, 4) by means of the extraction handle (14).

8. Device according to claim 7, c h a r a c t e r i z e d i n that said extraction limiting part (26 and/or 23) consists of that the extraction handle (14) has outer threads (26) with such length and/or that the inner extraction member (12) has inner threads (23) with such length that the length of screwing together of the outer threads (26) of the extraction handle (14) and the inner threads (23) of the inner extraction member (12) is limited.

9. Device according to any preceding claim, c h a r a c t e r i z e d i n

that a rear part (18) of the pin (7) has outer threads (17),

that a front end portion (15) of the inner extraction member (12) has a hole with inner threads (16) which mesh with the outer threads (17) of the pin (7), and

that the hole of the inner extraction member (12) has an inlet (22) without threads, said inlet (22) tapering conically in a direction inwards into the hole, and/or

that the rear part (18) of the pin (7) has an outer portion without threads, said outer portion having a conically increasing diameter in a direction towards the outer threads (17) of the rear part (18).

10. Device according to any preceding claim, characterized in that the inner extraction member (12) has a front end portion (15) with such outer dimensions or size that it can be inserted into a rear end portion (8) of the sleeve (6).

11. Device according to claim 10, characterized in that the front end portion (15) of the inner extraction member (12), which can be inserted into a rear end portion (8) of the sleeve (6), transforms into inner portions (20) of the inner extraction member (12) having larger outer dimensions through an edge (19) which can engage a rear edge (21) of the sleeve (6) when the inner extraction member (12) is operating.

12. Device according to any preceding claim, characterized in

that the inner extraction member (12) is an elongated rod and has a front end portion (15) with a hole which is provided with inner threads (16) which mesh with outer threads (17) on the pin (7),

that the inner extraction member (12) has a rear end portion (24) with a hole with inner threads (23) which fit or mesh with outer threads (26) on the extraction handle (14),

that the outer extraction member (13) is an elongated sleeve which is open in both ends, and

that the inner extraction member (12) fits into the outer extraction member and is axially displaceable in relation thereto.

13. Device according to claim 12, c h a r a c t e r i z e d i n that the inner extraction member (12) includes lateral holes (36, 37) which extend into the holes with the inner threads (16, 23) such that said holes can be flushed clean through said lateral holes (36, 37).

14. Device according to any preceding claim, c h a r a c t e r i z e d i n that the outer extraction member (13) has a sideways or laterally directed handle (34) for holding said outer extraction member (13) such that it does not rotate when the pin (7) is drawn or pulled out in the direction of extraction or withdrawal (R).

15. Device according to any preceding claim, c h a r a c t e r i z e d i n that the device consists of only three members, namely an inner extraction member (12), an outer extraction member (13) and an extraction handle (14).

16. Device according to any preceding claim, c h a r a c t e r i z e d i n

that the opening (10) in the sleeve (6) is round or oval or substantially round or oval, and

that the front part (11) of the pin (7) has a rounded side by means of which it can cooperate with front parts of the opening (10), and another side, opposite to said side, which is flat or substantially flat and which can cooperate with rear parts of the opening (10).

17. Device according to any preceding claim, c h a r a c t e r i z e d i n that the sleeve (6) and pin (7) are made of titanium.

18. Device according to any of claims 1-16, c h a r a c t e r i z e d i n that the sleeve (6) and pin (7) are made of stainless steel.